

DEPARTMENT OF MECHANICAL ENGINEERING

SUNY AT STONY BROOK

Manufacturing Process

Course Title:	MEC325 Manufacturing Processes, Spring 2017 (3 credits)
Prerequisites:	MEC 125 (MEC 125 is a pre- or co-requisite)
Blackboard:	http://blackboard.stonybrook.edu (It is required that you use the Blackboard for this course)
Lecture/Lab:	MWF 11:00-11:53 in Engineering 145
Instructor:	Prof. Cindy Chang email: qing.chang@stonybrook.edu
Office:	Light Engineering, Room 163; Phone (631)632-8329
Office Hours:	MW: 12:30-2:30PM & other time by appointment
Lab Staff:	Prof. Noah Machtay 632-9014; Room HE-148; nmachtay@ic.sunysb.edu
TA:	Xinyan Ou email: xinyan.ou@stonybrook.edu Office Hours: M, Thu: 2:30-4:00pm, HE-101 Sean Hardick email: sean.hardick@stonybrook.edu Office Hours: Tue, Thu: 2:30-4:00pm, Heavy Engineering Lounge, 2 nd floor
Course Objective:	The relationship between product design and manufacturing. Material properties and influence. Introduce traditional and nontraditional manufacturing process and their capabilities and limitations. Hands-on experience in the fundamentals of machining including sheet metal working, drilling, taping, turning, boring, milling, welding, and additive manufacturing. Production system analysis, random process, basics of inventory control and quality control.
Assignments & Deadlines:	Lab reports are due in class based on the lab rotation schedule and deadlines. Late reports will not be accepted after the class on the day they are due, and will receive zero in grade. Written reports should follow the "Format of Lab Reports" handout. Term project is due 4/27, vote for term project is due 5/6.
Textbook:	M. P. Groover, "Fundamentals of Modern Manufacturing materials, processes, and systems," 6 th ed., Wiley, 2009 (ISBN: 978-0-4-7046700-8)
Optional:	Kalpakjian & Schmid, "Manufacturing Processes for Engineering Materials," 4 th ed., Prentice Hall, 2003 Wallace Hopp & Mark Spearman, "Factory Physics," any edition
Examinations:	3 Midterm Exams (50 minutes), 4 quizzes (15 minutes, in class), 1 Final Exam <ul style="list-style-type: none">All exams are scheduled in class (Final exam follow the schedule), open book/notesNO make-up exams unless in extreme scenarios with Doctor's notes, police reports.

Grading: Semester letter grade is based upon your performance in the following categories

<i>Midterm exams (10% each)</i>	30%	<i>Homework</i>	10%
<i>Final exam</i>	20%	<i>Podcast term project</i>	10%
<i>Lab and reports</i>	20%	<i>Quizzes of SME video</i>	10%

Grading Scale of MEC325/580

NOT a curve – accumulation of your course work, as follows:

A: 100 – 92	A-: 91 – 89	B+: 88 – 86
B: 85 – 82	B-: 81 – 79	C+: 78 – 75
C: 74 – 70	C-: 69 – 66	D+: 65 – 63
D: 62 – 60	F: < 59	

Labs:

Lab	Title	System Description & Task	Person in charge
1	3D Printing	Design and fabricate a solid model using the Lulzbot Taz 5 3D printer	Prof. Noah Machtay
2	CNC machining	CNC machining (desktop milling machine or lathe)	Prof. Noah Machtay
3	Wire EDM (option)	Principle and practice of wire EDM machining	Prof. Noah Machtay

** A team of 4 students need to be formed during the first week of the class.

Term Project: Video Podcast (refer to podcast document)

Term project is due 4/26, vote for term project is due 5/6

Student Outcome (SO's) of this course:

- a. The ability to apply knowledge of mathematics, science, and engineering to mechanical engineering problem,
- b. The ability to design and conduct experiments, as well as to analyze and interpret data.
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability,
- e. The ability to identify, formulate, and solve engineering problems.
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global and societal context.

- j. A knowledge of contemporary issues.
- k. The ability to use modern engineering techniques, skills, and computing tools necessary for engineering practice.

Course Learning Objectives (CLO’s) and Assessment Tools:

COURSE LEARNING OBJECTIVES (CLOs)										SOs		ASSESSMENT TOOLS			
1. Demonstrate the skills to analyze and/or synthesize the parameters of a manufacturing process, such as force required or strain limit, in order to design or improve the operation of a manufacturing process										a, c		Assessment questions			
2. Demonstrate the skills to analyze factory floor operation and random process										a, e		Assessment questions			
3. Demonstrate the ability to write a CNC program, including the M-code and G-code										a, c, j, k		Assessment questions			
4. Demonstrate the skills in modern manufacturing through hands-on practice and lab assignments, such as EDM, CNC programming, and Rapid Prototyping										b, c, j, k		Hands-on lab assignments & lab reports			
5. Produce a multimedia video podcast term project containing a professional presentation of manufacturing process(es) or an engineering system										g, h, j		Rubrics of evaluation			
STUDENT OUTCOMES SUPPORTED (Scale 1-3)	a	b	c	d	e	f	g	h	i	j	k	l	m	n	
	1	2	2		2		2	2		3	3				
	3 – Strongly supported 2 – Supported 1 – Minimally supported										Program Criteria				
COURSE TOPICS	1. Introduction of manufacturing processes, engineering, and technology 2. Basics of engineering materials & properties 3. Theory of metal machining, Machining operations 4. CNC machining; M-code/G-code 5. Cutting tool technology & machine tools 6. Introduction to Additive manufacturing; EDM 7. Abrasive machining processes 8. Metal forming and sheet metal working 9. Casting & molding 10. Introduction to composite manufacturing 11. Factory physics, production system and inventory analysis 12. SPC and introduction to lean manufacturing, six sigma 13. Introduction to flexible manufacturing, digital manufacturing														

It is important to note that in order for you to earn a passing grade in this class, you have to earn a passing grade (60/100 percentile) in at least two lab/report and video podcast term project. The lab reports and video podcast are graded using rubrics that will be made available to you in class. Failure to comply with this requirement and report/podcast will result in a letter grade of “F”.

Course Outline:

23-Jan	1	introduction - syllabus, grading, lab, podcast, exam	
25-Jan		Lab tour	
27-Jan		introduction - Chapter 1	
30-Jan	2	CNC	
1-Feb		CNC	
3-Feb		CNC	
6-Feb	3	CNC, Ch03	
8-Feb		Ch 03, Ch04	
10-Feb		Ch05, Ch21	
13-Feb	4	Ch21 - cutting theory	
15-Feb		Ch21 - cutting theory (SME video: milling&machine center)	
17-Feb		Ch22-1 - machine tools (SME video: lathe operation)	
20-Feb	5	Exam 1	
22-Feb		Ch22-2 - machine tools (SME video: cutting tool geometry)	
24-Feb		Ch23 - tool technology (SME video:basic hole making)	
27-Feb	6	(SME video: cutting tool material, Workholding)	Quiz1: milling & machine center, tur
1-Mar		Ch25 - Grinding	
3-Mar		Ch25 - Grinding (SME video: Basics of grinding)	
6-Mar	7	Ch18 - Metal forming	Quiz 2: Cutting Tool geometry and m
8-Mar		Ch19 - Bulk deformation (SME video: Forging)	
10-Mar		Ch20 - Sheet metal	
13-Mar	8	spring recess	
15-Mar			
17-Mar			
20-Mar	9	Ch20 - Sheet metal (SME video: stamping)	Quiz 3: Grinding and Forging
22-Mar		Ch10 - Casting molding (SME Video: casting)	
24-Mar		Ch10 - Casting (SME Video: die casting)	
27-Mar	10	Exam 2	
29-Mar		Ch30 - Welding	
31-Mar		non-traditional mfg, EDM	Quiz 4: Stamping and Die Casting
3-Apr	11	Introduction to additive manufacturing	Explain Podcast
5-Apr		Factory physics 1 - Ch7	
7-Apr		Factory physics 2 - Ch7	
10-Apr	12	Factory physics 3 - Ch 7, Ch8	
12-Apr		Factory physics 4 - Ch8	
14-Apr		Factory physics 5 - Ch 8, Inventory	
17-Apr	13	Factory physics 6 - Inventory	
19-Apr		Factory physics - Inventory, review	
21-Apr		Production system, bottleneck	
24-Apr	14	Exam 3	
26-Apr		Catch up	Podcast Due
28-Apr		Mfg automation, digital mfg	
1-May	15	Quality control, SPC	
3-May		Quality control, SPC	
5-May		review	Vote Podcast

*Please referred to updated schedule posted on Black Board

Blackboard

You are required to use the Internet to access Blackboard and online information for important announcements, homework/handouts, and supplementary materials of the course. You can access blackboard at:

<http://blackboard.stonybrook.edu>

Please note that you have to use your NetID to login to the blackboard system.

DISABILITY SUPPORT SERVICES (DSS) STATEMENT

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>]

ACADEMIC INTEGRITY STATEMENT

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

CRITICAL INCIDENT MANAGEMENT

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.